pork industry handbook

COOPERATIVE EXTENSION SERVICE • UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

How and Where is Price Established?

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The question, "How and Where is Hog Price Established?" is a seemingly simple one. The pricing mechanism for hogs, however, is complex. Prices for hogs, like other commodities traded in competitive economies, are determined jointly by supply and demand, but a long list of factors affects supply and another list affects demand. In addition, the precise state of each of the factors and the exact influence on supply and demand is often not fully known at any given time.

Demand

"Demand" for a product is not consumption. If it were, "demand" for many U.S. farm products would be nearly synonymous with production. With minor adjustments for imports, exports, and carryover stocks, the pork produced in any given year is consumed. The question is: *at what price?* The definition of "demand," therefore, must consider both price and consumption. *It is the alternative quantities which consumers or other buyers will take off the market at specified prices.*

There are two tests of an increase in demand: (1) an increase in consumption at the same price (or higher), and (2) consumption of the same quantity (or more) at a higher price. Otherwise, we simply have variations in production and consumption and related prices, with no basic changes in demand.

For many years the per capita demand for pork was about constant—a given quantity placed on the market brought about the same price. This placed pork at a disadvantage relative to beef. During the 1950s and 60s, consumers clearly were demonstrating a willingness to buy more beef at higher prices—demand was increasing. Not so with pork. Recently, however, consumer demand for pork apparently has been improving. The public image of pork has improved measurably and old taboos are dis-

appearing. Efforts to improve pork quality and expenditures on promotion are paying off.

Among the factors normally expected to have some effect on producer level of demand for hogs are (1) consumer preferences, (2) consumer income, (3) production and prices of beef, broilers, and other competing products, (4) marketing costs and margins, (5) buyer occupation, (6) season of the year, and (7) location, race, religion, and a host of other minor factors. Even weather has an effect. If bad weather keeps consumers at home and out of the stores, demand drops temporarily. All of these are "demand shifters" as they may shift the price-quantity relationship.

The nature of demand, as well as shifts in it, are important. Demand for pork is "inelastic." What this means is that a given percentage change in production or supply placed on the market will have a much larger percentage effect on prices. That is why a percentage change in production which appears relatively small often has a surprisingly large 40-50% effect on producer prices. Implications are critically important. *An inelastic demand means that a large crop of hogs will provide producers with less total gross income than a small one.* This is clearly illustrated in Figure 1. The reason is that:

$$\text{Total income} = \text{Price} \times \text{quantity}$$

and with a small change in quantity in one direction and a large price change in the other, total income varies with prices and inversely with slaughter.

$$T I = P \times Q$$

small ↑ ↓ ↓ down large

Supply

"Supply" is *not* numbers produced or quantity placed on the market. It is a relationship between quantities
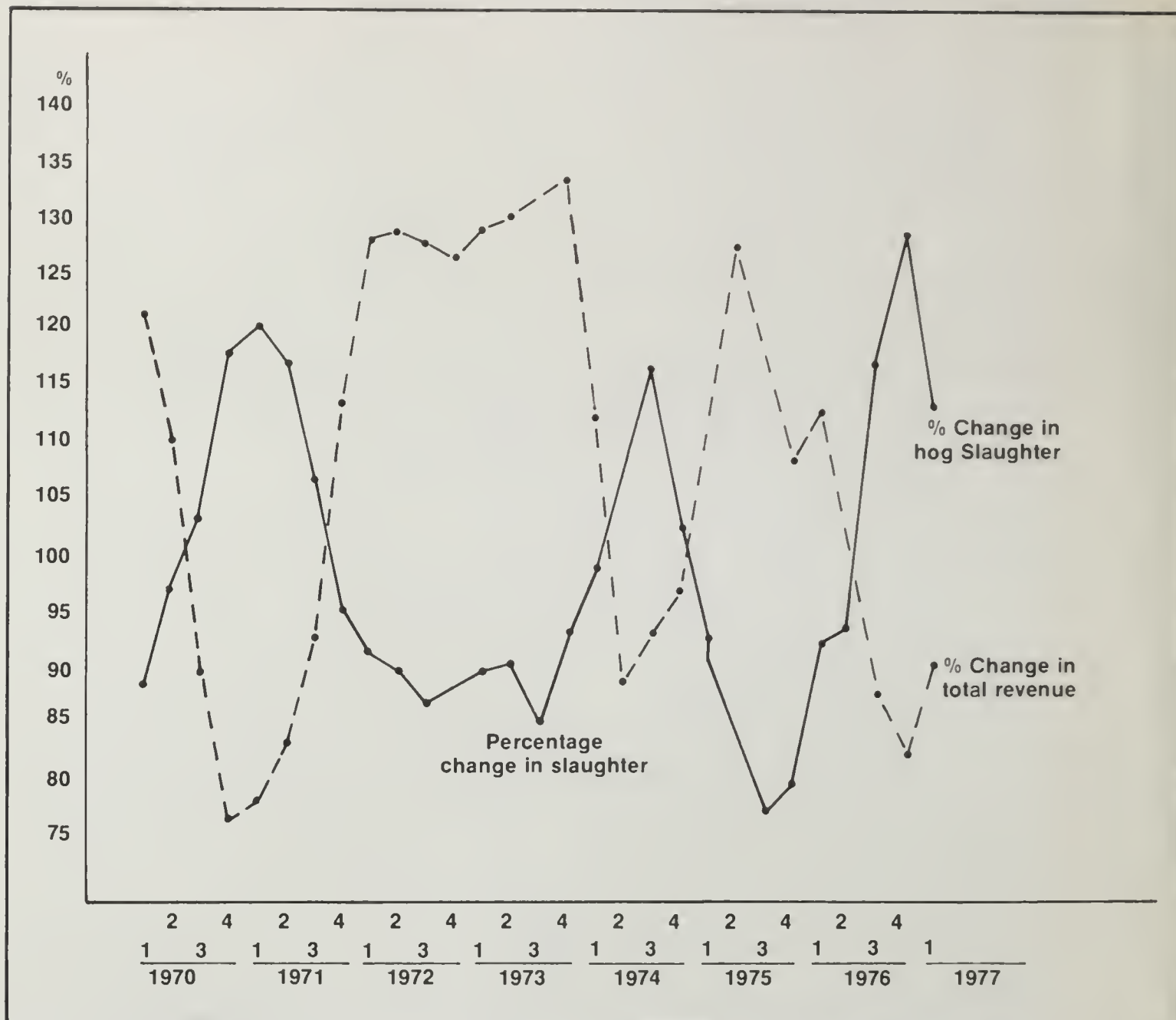
Figure 1. Percentage changes in hog slaughter from a year earlier and in total industry revenue.

producers are willing to produce and place on the market at all alternative prices. If the price goes up, given specific production costs, you are willing to produce more; if it goes down, you are willing to produce less. You have a supply function. Add this to the supply functions of all other producers and you have the industry supply function.

What determines industry supply? The "supply shifters" include (1) prices of feeder pigs, (2) prices of corn and other feeds, (3) other production costs, (4) the availability as well as the cost of labor, (5) opportunities for income from other enterprises such as beef cattle, (6) expectations, and (7) time. Over longer periods production responses to higher or lower prices, of course, will be greater than over the period of a few days or weeks. Even from one day to another or between weeks, however, producers often increase or reduce marketings in response to price changes.

Producers are no longer willing to produce hogs at the prevailing prices of ten years ago. Why? Because they can't afford to do so. Feed prices and all other costs have increased substantially. The industry has been forced to insist on higher prices, and it has done so periodically by sharply reducing production. During 1975 and through the first half of 1976, per capita pork production dropped to the lowest level of the postwar period.

Price "Determination" and "Discovery"

On the questions of who or what determines prices, it is useful to distinguish between price *discovery* and price *determination.* We have often found it easier to *discover* prices at concentration points in the marketing system, such as terminal markets, concentration yards or, in some cases, meat packers. This does not and never did mean, necessarily, that these are the points where prices are determined. Prices are *determined* through a continuous flow and interaction of supply-demand information both horizontally through the system (as among farmers or producers) and vertically from farmers to consumers and back again. Studies have shown that prices are simultaneously determined by everyone operating in the market and at all levels of the system.

Types of Price Changes

It also is useful to distinguish between "short term" and "long term" forces of price change in the hog and pork industry. Four basic types of price changes extending from long term to short term can be identified. These are (1) long-term trends, (2) cycles, (3) seasonal variations, and (4) the day-to-day or week-to-week variations associated with a wide variety of factors and forces discussed in some detail later in this fact sheet.
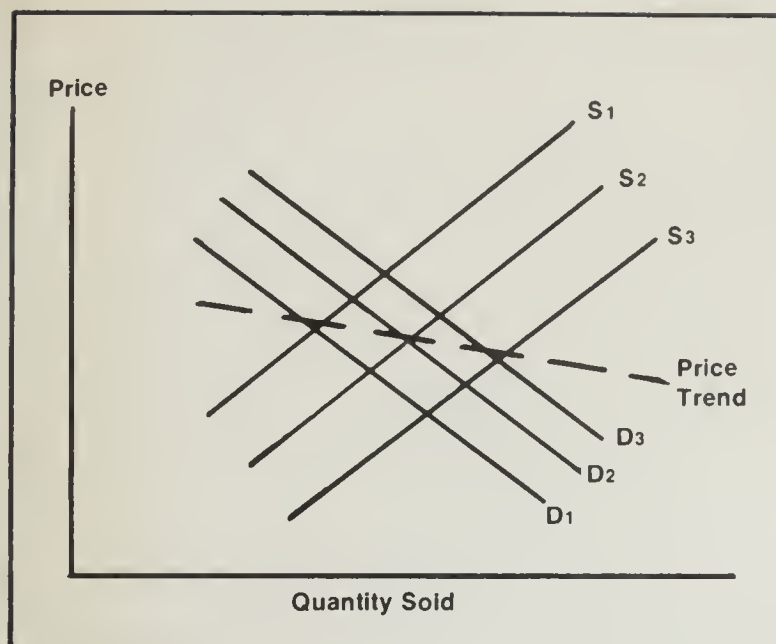
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Figure 2

Figure 3

Longer Term Forces of Price Changes

The longer term (5-10-15-year) trends in the U.S. hog prices are related mainly to *inflationary tendencies* in this country and to production and distribution efficiency. With inflation come increases in costs of labor, feed, fuel, and other production items. These higher production costs shift the supply function for hog producers. Higher hog prices are necessary for producers to respond and increase supplies. Effects of inflation on prices of all agricultural products generally are delayed and often catch producers in a price squeeze.

Improvements in demand due to changes in consumer preference are another source of long-term uptrend in prices. This assumes, of course, that the willingness to produce at specified prices and production does not increase rapidly enough to offset effects on prices of a strengthening demand. Alternative situations are described in Figures 2 and 3. Other situations illustrating effects of a downward adjustment in demand or a rise in costs leading to an upward shift in supply are easily visualized.

If, as demand rises, the supply function shifts to the right, indicating a producer's willingness to produce more hogs despite higher costs, then the long-term price trend on hogs may be steady or downward. The outcome depends, as illustrated, on the extent of shifts in demand relative to shifts in supply. Historically, farmers have demonstrated a tendency in the direction of Figure 2. One reason is that many producers do not determine costs—or do not consider all of the actual costs of production. In addition, many producers assume, too often, that they live in an isolated world wherein they will be the only producers inclined to increase production.

Hog cycles probably are the single most important source of wide variations in hog prices. They exist for two basic reasons. First, producers assume that selling prices, whatever they may be, will remain about constant at existing levels. The second is the necessary biological lag in responding to changes in prices. Once understood, hog cycles can be used by producers to their advantage rather than the reverse.

It is important to know, at all times, the position of the hog industry in the current hog cycle. There are two principal phases, the *expansion phase* and the *liquidation phase*. Each has distinctive characteristics. During the *expansion phase* of the industry, hog prices are relatively high because supplies are down. The culling rate on sows
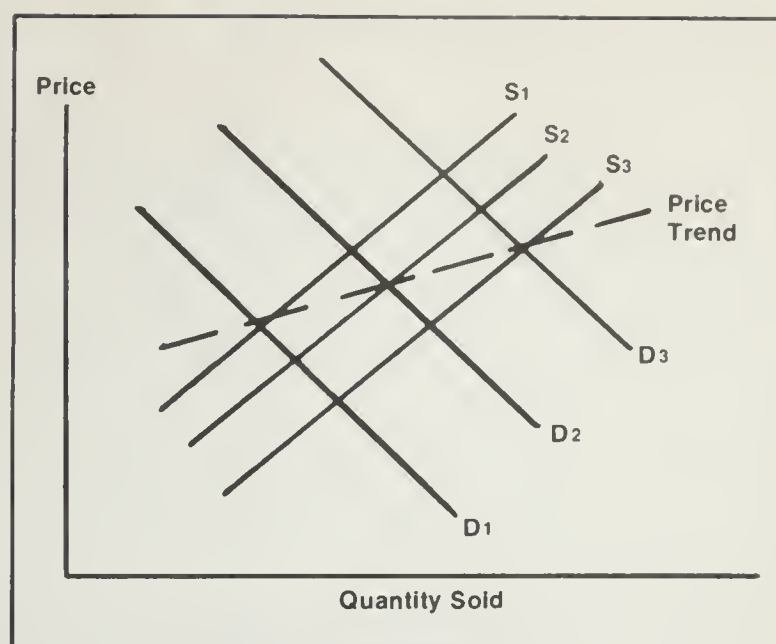
is reduced, sow slaughter drops, and more gilts are retained in herds for breeding purposes. These actions tend to reduce marketings further and increase market prices which are already quite high. The process continues until inventories are large enough that marketings increase substantially. At that point, prices begin to break and, because of an inelastic market demand, they often drop sharply.

The *liquidation phase* develops as prices turn lower. Producers withhold fewer gilts for breeding, adding to market supplies and depressing prices even more. As prices continue to drop, producers cull sows at a faster rate placing additional supplies on the market. The result can be a disastrous period of low prices. Some people believe these cycles will always occur in a free enterprise system of pork production.

Seasonality

Seasonal variations in prices, associated mainly with seasonal changes in hog marketings and slaughter, are common. Hogs have two fairly distinct seasonal price peaks and valleys. A "major" upturn in prices often occurs in late May or June and the summer, but a significant downturn usually runs from late September through October and November.

Reduced marketings and a secondary price peak is common in January and early February. The fall pig crop, normally smaller than the spring crop, reaches market weight in heaviest volume during March or April, depressing prices again during this season. Depressed prices may extend from late February into May or early June; however, the time span depends heavily on winter weather conditions and rates of gain. The result is highly variable year-to-year slaughter numbers for May and early June.

"Backlogs" of Hogs on Farms

Hogs may be marketed on a normal schedule, ahead of schedule, or behind schedule in relation to inventories. Lagged marketings are more serious to producers, since this situation often results in burdensome supplies of heavier weight hogs and depressed prices.

There are four conditions, primarily, in which hog marketings drop behind schedule and result in a "backlog" on farms. These are (1) exceptionally low, downtrending prices, possibly to levels under production costs when producers withhold hoping for price improvements, (2)

preoccupation with farming activities or adverse weather, (3) expectations of substantially higher prices, and (4) high hog prices in relation to feed prices. Although withholding, for whatever reason, may increase prices temporarily, it nearly always leads to "bunched" marketings at heavier weight and sharply lower prices. Even a small backlog can have a devastating effect on prices for a surprisingly long period

Wholesale-Live Hog Price Relationships

Wholesale pork prices are important to hog producers because packers use them to determine prices they can afford to pay for live hogs. Wholesale prices often change direction a day or more ahead of live hog prices. They, therefore, are useful for purposes of price "discovery" and arriving at short-term price predictions.

The average hog producer encounters difficulty in relating wholesale pork prices to live hog prices. Most pork is traded after carcasses are disassembled into cuts which have widely differing market characteristics. Many pork products are as different from one another as pork is from beef. Each pork cut has its own peculiar supply-demand environment.

The USDA prepares and publishes daily the combined value of pork cuts for carcasses in each of the principal carcass grades. These carcass values can be related to hog prices, although the relationship can be varied by certain market conditions and is not always precise. During a seasonal or cyclical uptrend in prices, for example, the hog-carcass price differences tend to narrow. On a downtrend they widen. This leads to the general relationships shown in Figure 4.

The result is conditions, observed by many producers, which seem inequitable. When producer prices are lowest with production up, packer margins and profits are greatest. When producer prices are highest, packer margins and profits are smallest.

There are several alternative explanations for these relationships. The bargaining power approach probably is the easiest to understand. Hog slaughtering capacity in the nation is limited and tends to be scaled toward an average crop. As hog production drops below historical averages and prices rise, the bargaining power of the producer improves. Packers need hogs to keep plants operating as efficiently as possible. Toward this end, they compete actively with one another for the available supply, driving live hog prices up relative to wholesale values. Packer profits are reduced by both narrowing gross margins and higher per unit slaughtering and processing costs.

As hog production rises above historical averages and prices drop, producer bargaining power drops drastically. Packer slaughtering capacity is sufficiently utilized that they are not forced to bid as actively or aggressively as when supplies are short. In extreme situations producers may encounter difficulty in finding a "home" for their hogs. All, of course, are eventually sold but, in the meantime, weight averages may rise. The eventual sacrifice in terms

of higher producer costs and lower prices often is great. The inelasticity of demand for pork contributes to these effects

Weights, Grades and Prices

Grades for pork carcasses and live hogs differentiate carcasses and animals primarily according to the expected yield of lean cuts or "cut-out." Carcasses that yield a greater share of weight in the high-value lean cuts are usually worth more. Hams, loins, picnics, and Boston butts are the major lean cuts, and the percentage "cut-out" is commonly based on the yield of these cuts from a carcass. Consumer preference determines that cuts such as the ham and loin receive a high value.

The USDA pork carcass grades and the expected yield of the four lean cuts as recently revised for each grade are as follows:

Grade	Yield
U.S. No. 1	60% and over
U.S. No. 2	57.5-60.0%
U.S. No. 3	55.0-57.5%
U.S. No. 4	52.5-55.0%
U.S. No. 5	Less than 52.5%

Some packers include bellies in their cut-out percentage. The belly is a fat-type cut rather than a lean cut but still makes up a substantial share of the carcass value. Including the belly adds 16-18% to the total percentage cut-out.

Weight is another important price determining factor. Generally, there is a broader demand for light to moderate weight cuts. Extremely heavy cuts, especially heavy hams, must either be sold at a lower price or boned and sold as smaller boneless hams for good consumer acceptance.

The price for each weight of cut is established by supply and demand. When very few heavy hogs are being marketed and the supply of heavy cuts is limited, all weights of a particular cut may sell at the same price. However, when large numbers of heavy hogs are marketed, oversupplying the demand for heavy cuts, the heavy cuts sell at an extreme price discount to lighter weights. In the former case, of course, there would be very little difference in price of hogs weighing 220 lb. compared to those of the same grade weighing 260 or 270 lb. In the latter situation, however, heavier hogs would sell at extreme price discounts to lighter weights.

In the latter situation, the value difference between grades of hogs becomes very small, and occasionally hogs in a higher grade are actually worth less than those in the next lower grade. This is because the hogs that cut-out a higher percentage of lean cuts yield heavier cuts than the same weight hog of a lower grade. If heavy cuts are selling at an extreme price discount, the value of the higher cut-out hogs is affected adversely.

Table 1, page 5, illustrates the expected yield of cuts by grade in the weight categories normally traded in wholesale dressed pork for 210-lb. and 250-lb. hogs.

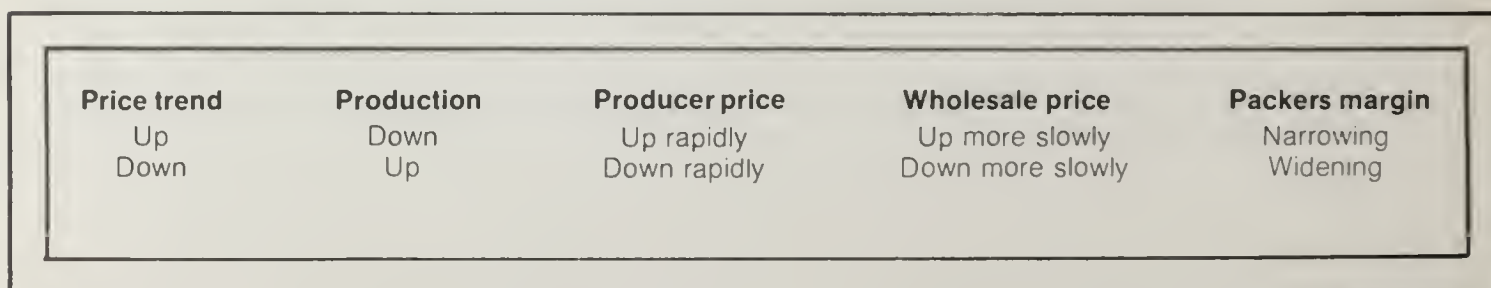| Price trend	Production	Producer price	Wholesale price	Packers margin
Up	Down	Up rapidly	Up more slowly	Narrowing
Down	Up	Down rapidly	Down more slowly	Widening

Figure 4

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Table 1. Expected yield of cuts by weight and grade.

Cut	Weight	150 LB. PORK CARCASS — 210 Lb. Live Hog — Percent Carcass Weight					180 LB. PORK CARCASS — 250 Lb. Live Hog — Percent Carcass Weight				
		No. 1	No. 2	No. 3	No. 4	No. 5	No. 1	No. 2	No. 3	No. 4	No. 5
Hams	14/Down	-	-	-	.82	4.98	-	-	-	-	-
	14/17	9.30	13.62	17.72	19.69	14.67	-	-	-	.27	5.37
	17/20	13.75	8.59	3.63	-	-	5.84	11.18	16.22	20.24	14.28
	20/26	-	-	-	-	-	17.21	11.03	5.13	-	-
Loins	8/14	4.10	7.97	11.54	14.73	16.40	-	-	-	-	4.05
	14/17	15.74	11.01	6.58	2.53	-	4.23	8.98	12.74	17.09	12.35
	17/20	-	-	-	-	-	15.61	10.00	5.38	.17	-
Bellies	8/10	-	-	-	-	-	-	-	-	-	-
	10/12	6.88	5.35	3.68	2.04	.35	-	-	-	-	-
	12/14	9.32	11.12	13.06	14.97	16.93	3.40	1.48	-	-	-
	14/16	-	-	-	-	-	12.80	14.99	16.15	14.37	12.53
	16/18	-	-	-	-	-	-	-	.59	2.64	4.75
Spareribs	3/Down	2.80	3.16	3.26	3.06	2.88	.80	1.38	1.83	2.30	2.62
	3/5	.84	.28	-	-	-	2.84	2.06	1.43	.76	.26
Picnics	4/6	-	-	-	-	1.26	-	-	-	-	-
	6/8	5.70	7.01	8.20	9.27	7.70	10.56	10.16	8.69	6.69	4.75
	8/12	4.86	3.15	1.56	.09	-					
Butts	4/8	7.80	7.40	7.02	6.62	6.24	7.80	7.40	7.02	6.62	6.24
Jowls		1.90	2.02	2.14	2.26	2.32	1.90	2.02	2.14	2.26	2.32
Neck Bones		1.12	1.03	.93	.84	.75	1.12	1.03	.93	.84	.75
Front Feet		1.15	1.10	1.04	.99	.94	1.15	1.10	1.04	.99	.94
Tails		.37	.38	.38	.39	.40	.37	.38	.38	.39	.40
50% Trimmings		4.16	4.05	3.93	3.82	3.71	4.16	4.05	3.93	3.82	3.71
Lard		7.61	9.26	10.91	12.56	14.21	7.61	9.26	10.91	12.56	14.21
TOTAL PERCENTAGE		97.40	96.50	95.58	94.68	93.74	97.40	96.50	95.58	94.68	93.74

NOTE: Product yield percentages do not total 100 percent because hind feet are excluded as being virtually valueless and there is some loss in the lard rendering process.

Source: Certain Packers

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